

1-25. (cancelled)

26. (previously presented) A computer system for storing life science information in a database, the computer system comprising:

- a processor;

- an electronic database storage module for storing in the database a library of machine-readable symbolic representations into which life science knowledge is adapted to be encoded according to a life sciences ontology, each machine-readable symbolic representation comprising:

 - at least two unspecified object identifiers;

 - a relationship connector, wherein the relationship connector relates two of the at least two object identifiers to each other based on a casual relationship between the object identifiers; and

 - constraint information that defines which connections among the object identifiers are permitted so that life sciences knowledge encoded into the machine-readable symbolic representation is semantically rigorous and based on the life sciences ontology; and

- a graphical user interface for managing addition of new life sciences data to a database, the graphical user interface comprising:

 - a display screen that receives an input selecting one of the machine-readable symbolic representations as a template to represent the new data based at least in part on the life science ontology;

 - the graphical user interface restricting input of any data element that does not conform to the constraint information associated with the selected machine-readable symbolic representation such that the semantically rigorous relationships for the life sciences ontology are maintained;

 - the graphical user interface receiving input of at least one data element that conforms to the constraint information to instantiate the machine-readable symbolic representation.

27. (currently amended) The ~~data-processing~~ computer system of claim ~~112~~ 26, wherein a set of machine-readable symbolic representations define one of: a biological function, and a chemical reaction.

28. (cancelled)

29 (currently amended) The ~~data-processing~~ computer system of claim 27, wherein the biological function comprises one of: transport, and digestion of a biomolecule.

30. (cancelled)

31. (currently amended) The ~~data-processing~~ computer system of claim ~~112~~ 26, wherein at least one of the at least two object identifiers identifies one of: a biomolecule, and a biological function.

32. (cancelled)

33. (currently amended) The ~~data-processing~~ computer system of claim ~~112~~ 26, wherein at least one of the at least two object identifiers identifies a relationship connector.

34. (currently amended) The ~~data-processing~~ computer system of claim ~~112~~ 26, wherein at least one of the at least two object identifiers identifies an identity relationship.

35. (currently amended) The ~~data-processing~~ computer system of claim ~~112~~ 26, wherein the relationship connector represents one of: a product relationship, a substrate relationship, and an enzymatic relationship.

36. (cancelled)

37. (cancelled)

38. (previously presented) The computer system of claim 26 wherein the graphical user interface permits a user to query the database based on the relationship connector.

39. (cancelled)

40. (previously presented) The computer system of claim 26 further comprising an access manager configured to restrict access to one or more portions of the electronic database.

41-91. (cancelled)

92. (previously presented) The computer system of claim 26 further comprising an inference engine executed by the processor.

93. (previously presented) The computer system of claim 92 wherein the inference engine provides modifications to at least one machine-readable symbolic representation, wherein the modifications comprise one or more of the addition of new fields, the addition of new relationships, and the addition of metadata.

94. (previously presented) The computer system of claim 92 wherein the metadata comprises one or more sources of the new data, a date the new data was received, a time the new data was received, and one or more experimental conditions under which the new data was created.

95. (previously presented) The computer system of claim 26 further comprising a harmonization and transfer module executed by the processor to interface with multiple disparate sources of life science data.

96. (cancelled)

97. (previously presented) The computer system of claim 95 wherein the harmonization and transfer module further translates given data into a data format compatible with at least one machine-readable symbolic representation.

98. (previously presented) The computer system of claim 26 wherein the graphical user interface displays pathways among the plurality of machine-readable symbolic representations, the pathways representing causal relationships among the machine-readable symbolic representations.

99. (previously presented) The computer system of claim 26 further comprising a managed account interface executed by the processor to attribute access restrictions to one or more machine-readable symbolic representations in the database, the access restrictions comprising one of: public access rights, subscription-based access rights, and proprietary access rights.

100. (cancelled)

101. (currently amended) The ~~data-processing computer~~ system as described in claim ~~44~~ 26 wherein the ~~knowledge-base database~~ comprises machine-readable symbolic representations representing enzyme reactions, binding interactions, modifications of polymers, protein phosphorylation reactions, gene expressions, acetylation, peptide-bond cleavage, glycosylation, lipidation, fatty-acylation, methylation, metallation, cross-linking, hydroxylation, sulfation, ADP-ribosylation, translocation and transcriptional activations.

102. (currently amended) The ~~data-processing computer~~ system of claim ~~404~~ 26 wherein at least one machine-readable symbolic representation represents a protein phosphorylation reaction comprising a reactant, a product, and a catalyst.

103. (currently amended) The ~~data-processing computer~~ system of claim ~~404~~ 26 wherein at least one machine-readable symbolic representation represents a gene expression comprising a gene and a gene product.

104. (currently amended) The ~~data-processing computer~~ system of claim ~~404~~ 26 wherein at least one machine-readable symbolic representation represents a transcriptional activation comprising a gene expression, an activation, and a transcriptional activator.

105. (cancelled)

106. (cancelled)

107. (currently amended) The ~~data-processing computer~~ system as described in claim ~~442~~ 26 wherein ~~the~~ a machine-readable symbolic representation is XML or pseudocode.

108. (previously presented) The computer system as described in claim 26 wherein at least first and second machine-readable symbolic representations in the database comprise a knowledge base of semantically-rigorous life sciences representations against which one of more reasoning algorithms are applied.

109. (previously presented) The computer system as described in claim 108 wherein applying a reasoning algorithm generates one or more pathways associated with a query to the knowledge base.

110. (previously presented) The computer system as described in claim 109 wherein the one or more pathways are displayed in the graphical user interface.

111. (previously presented) The computer system as described in claim 26 wherein the graphical user interface receives attribution information identifying a source of the new life sciences data.

112.-116. (cancelled)